We claim:

1. A ball-grid array package comprising:

a substrate having first and second sides;

an integrated circuit device attached to said first side of said substrate;

a metal cap having a side wall portion and a top portion forming an internal cavity, wherein said metal cap is attached to said first side of said substrate along a peripheral portion of said first side so that said integrated circuit device is within said internal cavity; and

an epoxy encapsulant material filling a substantial portion of said internal cavity, and said epoxy encapsulant material being in contact with both said integrated circuit device and said top portion of said metal cap.

2. A ball-grid array electronic package according to claim 1, wherein said metal cap has at least one hole in its top portion.

3. A ball-grid array package according to claim 1, wherein thermally conductive particles are dispersed in said epoxy encapsulant material, thereby enhancing the thermal conductivity of said epoxy encapsulant.

4. A ball-grid array package according to claim 3, wherein said thermally conductive particles are made from a material selected from one of diamond, cubic boron nitride, or an oxide such as alumina.

5. A ball-grid array package according to claim 1, wherein said metal cap is constructed from a material selected from one of copper, aluminum, or alloys thereof.

6. A ball-grid array package comprising:

a substrate having first and second sides;

a metal heat slug attached to said first side of said substrate, said metal heat slug having a die attach pad portion, at least one wirebond pad window portion, and peripheral rim portions;

an integrated circuit device attached to said die attach pad portion of said metal heat slug;

a metal cap having a side wall portion and a top portion forming an internal cavity, wherein said metal cap is attached to said metal heat slug along said peripheral rim portions so that said integrated circuit device is within said internal cavity; and

an epoxy encapsulant material filling a substantial portion of said internal cavity, said epoxy encapsulant material being in contact with both said integrated circuit device and said top portion of said metal cap.

7. A ball-grid array package according to claim 6, further comprising:

a retainer ring attached to said metal heat slug within said internal cavity.

8. A ball-grid array electronic package according to claim 6, wherein said metal cap has at least one hole in its top portion.

9. A ball-grid array package according to claim 6, wherein thermally conductive particles are dispersed in said epoxy encapsulant material, thereby enhancing the thermal conductivity of said epoxy encapsulant.

10. A ball-grid array package according to claim 9, wherein said thermally conductive particles are made from a material selected from one of diamond, cubic boron nitride or an oxide such as alumina.

11. A ball-grid array package according to claim 1, wherein said metal cap is constructed from a material selected from one of copper, aluminum, or alloys thereof.

12. A method of forming a ball-grid array package, comprising:

providing a substrate having first and second sides;

mounting an integrated circuit device on said substrate;

attaching a metal cap having a side wall portion and a top portion to said substrate along peripheral rim portions of said substrate forming an internal cavity between said metal cap and said substrate so that said integrated circuit device is within said internal cavity; and

filling a substantial portion of said internal cavity with an epoxy encapsulant material so that said epoxy encapsulant material comes in contact with both said integrated circuit device and said top portion of said metal cap.

13. A method of forming a ball-grid array package according to claim 12, further comprising dispersing thermally conductive particles in said epoxy encapsulant material.

14. A method of forming a ball-grid array package according to claim 13 wherein said thermally conductive particles are made from a material selected from one of diamond, cubic boron nitride or an oxide such as alumina.

15. A method of forming a ball-grid array package according to claim 12 wherein said epoxy encapsulant is filled into said internal cavity through at least one hole in said top portion of said metal cap.

16. A method of forming a ball-grid array package, comprising:

providing a substrate having first and second sides;

attaching a metal heat slug to said first side of said substrate, said metal heat slug having a die attach pad portion, at least one wirebond pad window portion, and peripheral rim portions;

mounting an integrated circuit device to said die attach pad portion of said metal heat slug;

attaching a metal cap having a side wall portion and a top portion to said metal heat slug along said peripheral rim portions of said metal heat slug forming an internal cavity between said metal cap and said substrate so that said integrated circuit device is within said internal cavity; and

filling a substantial portion of said internal cavity with an epoxy encapsulant material so that said epoxy encapsulant material comes in contact with both said integrated circuit device and said top portion of said metal cap.

17. A method of forming a ball-grid array package according to claim 16, further comprising dispersing thermally conductive particles in said epoxy encapsulant material.

18. A method of forming a ball-grid array package according to claim 17 wherein said thermally conductive particles are made from a material selected from one of diamond, cubic boron nitride or an oxide such as alumina.

19. A method of forming a ball-grid array package according to claim 16 wherein said epoxy encapsulant is filled into said internal cavity through at least one hole in said top portion of said metal cap.

20. A method of forming a ball-grid array package, comprising:

providing a substrate having first and second sides;

attaching a metal heat slug to said first side of said substrate, said metal heat slug having a die attach pad portion, at least one wirebond pad window portion, and peripheral rim portions;

mounting an integrated circuit device to said die attach pad portion of said metal heat slug;

attaching a retainer ring to said metal heat slug so that said integrated circuit device is within said retainer ring;

dispensing a first dose of an epoxy encapsulant material over said integrated circuit device within said retainer ring;

curing said first dose of an epoxy encapsulant material;

attaching a metal cap having a side wall portion and a top portion to said metal heat slug along said peripheral rim portions of said metal heat slug forming an internal cavity between said metal cap and said substrate so that said integrated circuit device is within said internal cavity and a small gap is formed between an inside surface of said top portion of said metal cap and said first dose of an epoxy encapsulant material; and

filling a substantial portion of said small gap with a second dose of an epoxy encapsulant material through at least one hole in said top portion of said metal cap whereby the second dose of an epoxy encapsulant material is in contact with said integrated circuit device and said top portion of said metal cap.

21. A method of forming a ball-grid array package according to claim 20, further comprising dispersing thermally conductive particles in said epoxy encapsulant material.

22. A method of forming a ball-grid array package according to claim 20 wherein said thermally conductive particles are made from a material selected from one of diamond, cubic boron nitride or an oxide such as alumina.